Mercury Deposition

United States Department of Agriculture

Forest Service Air Program

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Background

Unsafe mercury levels in fish are a national public health concern. Fish consumption advisories exist in 46 states (**Fig 1**), affecting 31 National Forests, Grasslands, and Recreation Areas. While many natural sources exist, atmospheric deposition of anthropogenic mercury, principally from coal combustion, is the major source. Because mercury is fairly stable, upland areas can accumulate large burdens from decades of deposition. Fire volatilizes stored mercury (**Fig 2**), and fire-induced soil erosion washes what's left into wetland or lake ecosystems. There it is eventually converted to the most toxic form, methylmercury, and incorporated into fish tissue.

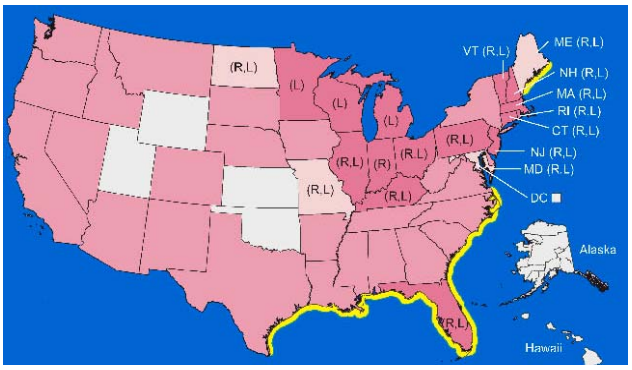

Fig 1. Fish Advisories for Mercury by state. Of 20 statewide advisories; five also include advisories for specific waterbodies*. 26 states make advisories only for specific waterbodies. Only 4 states have no mercury advisories. *WV recently established an advisory for the Ohio River.

Successes

- **Boundary Waters Canoe Area Wilderness and wildfire mercury:** The Superior National Forest air program, North Central Research Station, University of Minnesota, and US Geological Survey, were together awarded $423,000 over three years (2004 – 2006) from the Joint Fire Sciences Program to investigate wild- and prescribed-fire contributions to mercury levels in fish and to develop mitigation strategies for the BWCAW and other NFS lands. About 75,000 of the 1.1 million acre BWCAW will be burned to reduce fuel loads, providing a rare opportunity to study mercury in a lake- and wetland-dominated wilderness. Soil, water, and fish chemistry will be studied, before and after burns, in and out of watersheds with prescribed burns. Pre-burn results indicate that soil mercury levels show an east-west pattern and decrease with depth showing they are independent of local geology.

Fig 2. Fire may impact mercury levels in fish.

- **Mercury Deposition Dynamics report:** As part of the USDA 'State of the Sciences' meeting in San Diego, the Forest Service Northeast Region Air Resource Program Manager, Chuck Sams, wrote an extensive literature review of mercury deposition sources and environmental dynamics. It is now known that fish methylmercury is adversely affecting mammals and birds nationwide.

Challenges

- While much data has already been collected, unpredictable timing of prescribed fires within the BWCAW makes data collection challenging. Post-burn fire effects may take years to fully manifest themselves. Continued sampling and funding beyond the first three years (which ends in FY06) is needed.
- Funding for FY06 prescribed burning activities on the Superior NF is uncertain due to the need to initiate contracts early in the FY for aerial resources.
- Until recently, methylmercury contamination in mammals and birds was assumed to be directly linked to aquatic systems. Methymercury accumulation mechanisms are still poorly understood but recent New England and Canadian work shows that upland species such as the rare, forest-dwelling songbird, Bicknell's Thrush, can also carry heavy burdens of methylmercury.